

Development and Evaluation of Bamboo Shoot Soup Cube

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Abstract - Bamboo shoots are young, edible bamboo plants which are considered as one of the underutilised vegetables that have just emerged from the ground. This study aims to formulate the new variety RTC soup cube that can be diluted in hot water to yield a nutritious soup. **Objectives:** The study was carried out to formulate and standardize the soup cube using bamboo shoot, to analyse the sensory properties, microbial (in room temperature and refrigeration temperature), physico-chemical properties and nutrients composition. **Methodology:** In this study, three different variation of soup cube (S1, S2 and S3) and one control soup cube (C) was prepared. The soup cube of different variations was reconstituted to prepare soup by diluting each 20 grams of cubes (C, S1, S2, S3) in 100 ml of hot water and was subjected to sensory evaluation on the basis of colour, consistency, flavour, taste and appearance by 10 untrained panel members using 9-point hedonic scale. **Results:** From the sensory analysis, S2 was selected as the best product. The formulated soup cube S2 contained 3.15 of ash (g/100g), 85.8 of moisture (g/100g), 47.9 of energy (Kcal), 8.60 of carbohydrate (g/100g), 1.71 of protein (g/100g), 0.74 of fat (g/100g), 3.22 of insoluble dietary fibre (g/100g), <0.5 of soluble dietary fibre (g/100g), 68.1 of calcium (mg/100g), 2.57 of potassium (mg/100g), 238 of sodium (mg/100g), 2.57 of iron (mg/100g) and 2.38 of copper (mg/100g). The presence of anti-nutrient in the final product S2 were below determination limit. The pH for 1st, 7th and 15th day were found to be 4.86, 4.78, and 4.53 respectively, titratable acidity for 1st, 7th and 15th were found to be similar (0.28). The microbial study such as total plate count for 1st, 7th and 15th at refrigeration temperature was found to be 16X10², 27X10², and 69X10² and yeast, mould and E.coli count were found to be less than 10 which shows the safety of product for the consumption till 15 days whereas under room temperature, the product was stable only for 3 days. **Conclusion:** Hence, it can be concluded that soup cube from bamboo shoot paste provides nutritional benefits and can be

recommended to all age group and it can be recommended to the people who want to reduce their weight, PCOS patient, calcium deficient patient.

Index Terms - Bamboo shoots, soup cube, soups, vegetable soup.

I.INTRODUCTION

Now a days, Ready to Cook foods have become popular due to the fast-developing urban lifestyle, an increasing dominance of the nuclear family and rising disposable income. Ready To Cook (RTC) or convenience foods are foods that are processed to cook readily with very little extra efforts [4]. In other words, RTC are partially cooked products that can be used in a very convenient form within short duration [5]. Soup products available in market are considered one of the RTC product and soup is considered as fast form of cookery. It is the man's oldest food [6].

Soups are mostly prepared by combining the ingredients in either boiling water or in stock [7]. The soups and soup products are mostly prepared using ingredients such as meat, pulse, cream, fruits or vegetables or in combination. Among these, soups made of vegetables are commonly consumed. They are the main drivers which helps to achieve global nutritional security by providing nutrients such as vitamins and minerals.

In India, vegetable contributes total horticultural production of about 58.73%, producing about 162.89 million tonnes of vegetables. Though agro climatic condition permit India to grow more than 60 cultivation of vegetable crops, some vegetables are lesser known which has not given much attention and these vegetables with lesser known comes under category of underutilized vegetables.

One of such underutilised vegetables is bamboo shoots. Bamboos are generally known for its diverse use such as in constructions of building, weapons, musical instruments, etc. But bamboo shoots are the young edible bamboo plants that have emerged from the ground and if it grows further, becomes a hard bamboo and loses its edibility. The main reason for bamboo shoots being an underutilised product is, because it comes under the category of Traditional Forest Products (TFPs). TFPs are biological and generally they are not cultivated [1].

Bamboo shoots are seasonal crop (spring season through early summer) mostly consumed as vegetable by tribal population. Many species of bamboo shoots are grown in India. Bamboo shoots being an underutilised vegetables are rich in nutrients. Bamboo shoots have high content of protein (amino acids), carbohydrates, fibre, very low in fat, phytosterol (that come under the category of nutraceuticals) and function as appetizer. In addition, they play a vital role in keeping a live cultured diversity associated with health practices and food habits [3]. They are rich in minerals, vitamins and other health promoting factors. They play a vital role in the diversification of diet which makes a balanced source of micronutrients. They provide nutrition to the poor and thus helps in meeting the nutrient requirements preventing them from malnutrition. They also help low-income urban people. Bamboo shoots are short lived, mostly unpreserved [2]. Considering the nutritional benefits and bamboo shoots acts as appetizer, the soup cube will be made from bamboo shoot paste to improve the nutritive quality and the organoleptic characteristics.

OBJECTIVES:

- To utilize the bamboo shoots in formulating food products.
- To develop the soup cube with bamboo shoot paste that can be diluted with water to yield nutritious soup.
- To analyze sensory properties, nutrient composition, anti-nutrient and storage study.

II. MATERIALS AND METHODS

A. Selection and procurement:

The fresh juvenile shoots of Bambusa Tulda was procured from Assam and other ingredients such as carrot, capsicum, tomato, onion, onion stalks,

coriander leaves, mixed dry herbs (rosemary, oregano, basil, thyme), corn flour, spices such as salt, asafoetida, pepper were procured from local market of Chennai, Tamil Nadu.

B. Preparation of raw materials:

Preprocessing of bamboo shoots and preparation of paste:

The shoots were preprocessed such as washed properly, chopped and subjected to boiling in 5% NaCl for 25 mins, drained, washed again in running water to remove hydrogen cyanide which is considered toxic for human consumption. Then the treated bamboo shoots are grounded into paste.

Preprocessing of vegetables and preparation of paste:

The fresh vegetables such as carrot, capsicum, tomato, onion, onion stalks, coriander leaves are washed thoroughly, chopped, cooked in pan, and blended into paste.

C. Formulation and standardization of soup cube:

Standardization of ingredients:

Control soup cube C was prepared by using vegetable paste, corn flour, mixed dry herbs and spices. Bamboo shoot paste was incorporated in three different variations named S1, S2 and S3 respectively along with vegetable paste and other ingredients. The different variation of soup cube were given in Table 1.

Table 1: Variation of soup cubes

Ingredients	Control group(C)	Variation 1 (S1)	Variation 2 (S2)	Variation 3 (S3)
Corn flour	50g	50g	50g	50g
Bamboo shoot paste	-	50g	100g	150g
vegetable paste	500g	450g	400g	350g
Mixed herb (rosemary, oregano, thyme, basil)	10g	10g	10g	10g
Spices (asafoetida, salt, pepper)	15g	15g	15g	15g

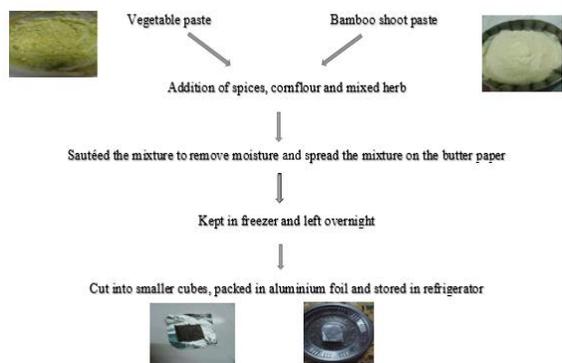


Fig 1: Formulation of soup cube



C-control; S1, S2, S3 – variations of soup cube

Fig 2: Different variations of soup cubes

D. Sensory evaluation:

The soup cubes were reconstituted to prepare the soup by dissolving one cube (20g) in 100ml of hot water and then it was analysed for acceptability of the product by 10 untrained panel members using 9 point hedonic scale with the help of score card. The score card allows panel members to score the product from 1 to 9 (where 1 represented disliked extremely and 9 represented liked extremely) in terms of appearance, taste, flavour, consistency, colour and overall acceptability.

E. Analysis of soup cube:

Soup cube was subjected to nutrient analysis [Energy, carbohydrate, protein, fat, fibre (soluble or insoluble), calcium, potassium, sodium, copper, iron, ash, moisture and Total Soluble Solid], anti-nutrient analysis (hydrogen cyanic acid) using standard procedures, storage study for 1st, 7th, 15th day – a) physico-chemical property (pH and titratable acidity), b) microbial study at room temperature and freezing temperature (Total plate count, E.coli, yeast and mould), and Statistical analysis (mean and standard deviation).

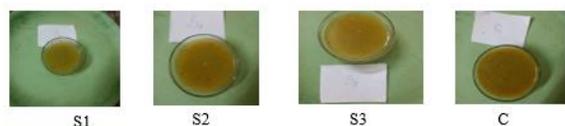


Fig 3: Reconstituted soup from different variation of soup cube

III. RESULTS AND DISCUSSION:

A. Sensory evaluation:

The sensory acceptance is one of the important aspect in food product development. The table 2 shows the mean acceptability and standard deviation scores of control (vegetable paste) and three different variations S1, S2, S3 (incorporating bamboo shoot paste along with vegetable paste). In the present experiment, the acceptability of the reconstituted soup in all selected parameters such as appearance, taste, flavour, consistency and overall acceptability was high in variation II (S2) when compared to other variations. The mean score for variation II (S2) was 8.6, 8, 8.9, 8.1 and 7.9 respectively in terms of appearance, taste, flavour, consistency and overall acceptability.

Table 2: Mean acceptability and standard deviation scores

Sensory attributes	Control(C)	S1	S2	S2
Appearance	7.5± 0.70	8± 0.5	8.6± 0.5	8.1± 0.3
Taste	7.± 0.51	7.8± 0.60	8± 0.5	7.6± 0.70
Flavour	8.7±0.48	8.6± 0.5	8.9± 0.33	8.8± 0.33
Consistency	7.8±0.42	7.5± 0.52	8.1± 0.0	8.0± 0.33
Colour	7±0.0	7.8± 0.33	7.9± 0.33	7.7± 0.44
Overall acceptability	7.5±0.52	8.3± 0.5	8.5± 0.52	8.4± 0.52

NOTE: values are expressed with mean and standard deviation

Sample - (Vegetable paste: Bamboo shoot paste) in grams

Control (C) - (500:0)

Variation I (S1) - (450:50)

Variation II (S2) - (400:100)

Variation III (S3) - (350:150)

B. Analysis of soup cube:

i) Nutrient analysis:

Among the three formulations (S1, S2, S3), variation 2 (S2) was taken for analysis for its ash, moisture, energy, protein, fat, fibre (soluble and insoluble), sodium, calcium, potassium, iron and TSS. The results

are presented in table 3. Variation II soup cube contains high amount of potassium, calcium, copper, moisture, insoluble fibre, low amount of fat content.

Table 3: Nutrient analysis of highly acceptable formulation (variation II)

NUTRIENTS [g/ 100g of soup cube /(%)]	VARIATION II(S2)
Ash (%)	3.15
Moisture (%)	85.8
Energy (%)	47.9
Carbohydrate (%)	8.60
Protein (%)	1.71
Fat (%)	0.74
Fibre (%)	
Insoluble Dietary Fibre	3.22 <0.5
Soluble Dietary Fibre	
Total Soluble Solids	11.5
Calcium (mg/ 100g)	68.1
Iron (mg/ 100g)	2.57
Copper (mg/ 100g)	2.38
Sodium (mg/ 100g)	238
Potassium (mg/ 100g)	65

ii) Anti-nutrient analysis:

In a study of Dibangana Choudhry [2] stated that raw bamboo shoots of bambusa tulda contains total HCN content of about 128mg/100g. The final product of variation II contained HCN content in below detection level (<2.0mg/100g) which shows variation II is safe for consumption.

iii) Storage study:

The storage study was presented in the table 4. Since the microbial parameters was in limit throughout the study period, the product is considered to safe for consumption till 15 days. But under room temperature, product was stable for only 3 days.

Table 4: Storage study

PHYSICOCHEMICAL PROPERTIES				
Parameters	1 st day	7 nd day	15 th day	
pH	4.86	4.78	4.53	
Titratable Acidity	0.28	0.28	0.28	
MICROBIAL STUDY				
Total Plate Count (CFU/g)	16X10 ²	27X10 ²	69X10 ²	
E.coli (CFU/g)	<10	<10	<10	
Yeast and Mould (CFU/g)	<10	<10	<10	

IV CONCLUSION

The tremendous improvement of health consciousness among consumers have stimulated the field of functional foods and the bamboo shoots can be one of them. The present study concluded that developed bamboo shoot soup cube (S2) in which each cube weighed around 20g contains sufficient amount of nutrients in terms of both quality and quantity. The developed product was rich in minerals such as calcium, copper, potassium, insoluble fiber, low in fat and a moderate carbohydrate content. This product can be consumed from the children to the old age people. This product can also be recommended for diabetic, PCOS patient, calcium deficient people and people who want to reduce their weight. Hence it can be concluded that the formulated bamboo shoot soup cube is nutritious, cost-effective, time saving and makes more convenient as it comes under RTC product.

V RECOMMENDATION FOR FURTHER WORK

Many studies can be conducted to develop food product using bamboo shoots so that community can be benefited by consuming nutrient rich bamboo shoots incorporated products.

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